

Patent  
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Steinbichler et al.  
Application No.: 10/069,093  
Filing Date: February 1, 2002  
For: INJECTION-MOULDING METHOD  
Examiner: Jill Lynne Heitbrink  
Art Unit: 1732

Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

DECLARATION UNDER 37 CFR 1.132

Sir:

I, the undersigned, Georg Steinbichler, resident in Boder 59, 8786 Rottenmann, Austria, hereby declare:

1. I am co-inventor of the above identified patent application.
2. My education and professional credentials are as follows and establish me as a person skilled in the field of this patent application:
  - 1974 - 1981 Studies of Technology in Plastics at the Montan University of Leoben, Austria  
Final degree: Dipl.-Ing. (graduate engineer)
  - 1997 - 1981 Bauknecht Austria in Rottenmann  
Development of plastic parts and construction of injection molding tools
  - 1982 - 1999 Engel Maschinenbau GmbH in Schwertberg, Austria  
Application engineer, Head of the Department for Process Development,  
Head of the Department for Process and Application Engineering
  - Since 1983 Lecturer for "Fabrication-compatible Constructing of Injection Molding Parts" at the Technical Academy in Esslingen, Germany
  - 1985 - 1995 University teaching position for Injection Molding Engineering at the Establishment for Secondary Education in the Technology of

## Plastics in Vienna, Austria

- Since 1986 Civil Engineer in the Technology of Plastics  
2000 - 2003 Engel Maschinenbau GmbH in Schwertberg, Austria  
Head of the Department for Pre-Development and Process  
Technology  
Since 2003 Engel Austria GmbH in Schwertberg, Austria  
Head of the Department for Research and Development

3. I understand the English language and have read the above identified application.
4. This declaration is being filed with an amendment in response to the Office Action issued April 27, 2005 in order to show that:

In the Figure and on page 2, last paragraph, and page 3, lines 1 and 2 of the description of the application, a controllable hydraulic unit 12, which acts on a closure needle 9 by means of a lever 11, is disclosed. Said parts together form a control means for opening the shut-off means (needle 9), which closes the antechamber, from which plastic material is injected into the mould cavity. At the time the invention was made, it was well known in the art that such control means can be actuated hydraulically as explicitly shown, or alternatively, for example, electrically.

When making the invention, Mr. Pokorny and I found that the quality of the finished product is surprisingly more uniform if there is a certain delay (preferably of 1 or 2 seconds) between the reaching of the maximum pressure inside the antechamber 1 and the opening of the shut-off means as mentioned on page 4, last paragraph of the description. In order to be able to implement said awareness into an injection molding method based on an expansion process, it is necessary to use a control means which has the ability to open the shut-off means with a delay after the front opening of the antechamber is brought into contact with the mold in a way necessary for injection. In addition, we found that it can be beneficial to use such a control means to open the shut-off means in a controlled manner for further modifying the pressure pattern in the mold cavity, which is determined primarily by the adiabatic relief of the pressure of the plastic material in the antechamber (see description, page 3, lines 9 to 12).

In awareness of the application as filed, everybody skilled in the art understands that the controllable unit 12 being actuated hydraulically is only one preferred example of how to

build a control means having such abilities and that said control means could be actuated electrically or by any other suitable means without departing from the invention. Therefore, the application implicitly teaches to use any other suitable type of control means, too.

Bronnenkant et al. (US 3,052,925) is the only reference mentioned in the Office Action dated April 27, 2005, which discloses to inject the plastic material by an expansion process. US 8,322,347 B1 (see abstract), US 5,067,255 (see column 5, last paragraph), US 3,241,192 (see column 9, lines 22 to 27) and US 2,318,031 (see page 6, right column, lines 44 to 47) are references which teach to inject the plastic material either by movement of a screw or by movement of a plunger or the like. US 4,266,928 discloses a completely different process, in which plastic granules are, in a first step, sucked into a mold being under a vacuum and in a further step, sintered. According to Bronnenkant et al. the shut-off means (needle 63) is actuated when the nozzle 60 is pressed against the mold by means of a movement of the heating cylinder. Bronnenkant et al. does not teach to open the needle 63 with the help of an additional control means (like the controllable hydraulic unit 12 of the application), which has the ability to open the shut-off means with a delay and in a way to modify the pressure pattern in the mold cavity after the front opening of the antechamber is brought into contact with the mold in a way necessary for injection. Therefore, the new independent claim is novel over the prior art.

A basic problem of the method and the apparatus disclosed by Bronnenkant is, that the shut-off means which is completely dependent on the movement of the heating cylinder opens at a time when the contact pressure between the nozzle and the mold is still not high enough to seal the nozzle against the mold. Neither Bronnenkant nor the other references realise, that it is a basic requirement of an injection process being based on expansion that the necessary contact pressure and with that said sealing has to be achieved completely before the explosion like injection starts. If this requirement is not fulfilled leakage will occur and the mold cannot be filled completely which means, that the quality of the product is not acceptable. When making the invention we discovered that it is necessary for an injection process based on expansion to use a control means which is able to guarantee that the shut-off means is only opened after the build up of the contact pressure between the nozzle and the mold is completed.


The person skilled in the art would only employ such a more complex and costly control means if they would know that it is possible to further improve the method and the product manufactured. Neither Bronnenkant et al. nor the other references cited in the Office Action assign any reason to use such a control means with an additional actuator in

connection with an expansion process. Only the benefits mentioned above justify the use of a control means having a separate actuator but these benefits are not recognized in the cited art.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statement may jeopardize the validity of the application or any patent issuing thereon.

Date: 24-08-2005

Inventor:

  
Georg Steinbichler